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BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

Application Number: 10/064,808
Filing Date: August 20, 2002
Appellant(s): BUNKER, RONALD SCOTT

Patrick K. Patnode
For Appellant

EXAMINER'S ANSWER

This is in response to the appeal brief filed 19 June 2006 appealing from the Office action mailed 25 November 2005.

(1) Real Party in Interest

A statement identifying by name the real party in interest is contained in the brief.

(2) Related Appeals and Interferences

The examiner is not aware of any related appeals, interferences, or judicial proceedings which will directly affect or be directly affected by or have a bearing on the Board's decision in the pending appeal.

(3) Status of Claims

The statement of the status of claims contained in the brief is correct.

(4) Status of Amendments After Final

No amendment after final has been filed.

(5) Summary of Claimed Subject Matter

The summary of claimed subject matter contained in the brief is correct.

(6) Grounds of Rejection to be Reviewed on Appeal

The appellant's statement of the grounds of rejection to be reviewed on appeal is correct.

(7) Claims Appendix

The copy of the appealed claims contained in the Appendix to the brief is correct.

(8) Evidence Relied Upon

JP10-255827	Katsukuni et al.	9-1998
US 5,688,610	Spaeh et al.	11-1997
JP7-249419	Masahiro et al.	9-1995
EP 0 374 368	Buswell et al.	6-1990
US 4,859,545	Scheffler et al.	8-1989

US 6,764,784	Gillett et al.	7-2004
JP9-223512	Asano	8-1997

(9) Grounds of Rejection

The following ground(s) of rejection are applicable to the appealed claims:

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

2. Claims 1-4, 9, 12-13, 21-23, 25, and 40-41 rejected under 35 U.S.C. 103(a) as being unpatentable over JP10-255827 in view of Spaeh et al. (5,688,610).

Claim 1: JP10-255827 discloses in Figures 1-3 a fuel cell assembly comprising: an inlet and an outlet and at least one bypass flow channel ($8^{1\text{-}N}$, $9^{1\text{-}N}$), the bypass flow channel being configured to be in fluid communication with the inlet, the inlet and outlet being configured to provide fluid communication to and from the fuel cell assembly, respectively; at least one fuel cell stack (1^1-1^N) and at least one direct flow channel (via $6^{1\text{-}N}$, $7^{1\text{-}N}$), the at least one fuel cell stack comprising at least one fuel cell (1^1), and the direct flow channel being configured to be in fluid communication with the inlet and outlet; and a control system (5), which is configured to control an oxidant flow (3) from the inlet to the direct and bypass flow channels (abstract, and paragraphs [0008]-[0014]).

JP10-255827 does not disclose a housing having an inlet and an outlet and defining at least one bypass flow channel.

Spaeh et al. in Figures 1 and 2 define a housing (14) having an inlet (4) and an outlet (4) configured to provide fluid communication to and from the housing, and wherein supply air is freely guided to the cell within the housing which would provide a bypass flow of air (col. 2: 26-67).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have modified the fuel cell assembly of JP10-255827 by incorporating the housing of Spaeh et al. because Spaeh et al. teach a housing that would have provided an air supply guidance means common to a plurality of fuel cell stacks and is not connected directly with the fuel cell stacks thus providing an easy interchangeably of individual fuel cell stacks thereby improving the overall efficiency and maintenance costs.

Accordingly, the JP10-255827 combination would obviously provide at least one bypass flow channel defined by the housing and an inlet and configured to provide fluid communication to and from the housing.

Claims 2 and 22: The rejection is as set forth above in claim 1 wherein further JP10-255827 discloses in Figures 1-3 a bypass flow channel further configured to be in fluid communication with the outlet (abstract).

Claims 3 and 25: The rejection is as set forth above in claim 1 wherein further JP10-255827 discloses in Figures 1-3 a control system configured to adjust the oxidant flow to the direct and bypass flow channels in response to a feedback signal (i.e. abnormality detecting device 4 is inputted to a bypass and direct control valve) (abstract).

Claim 4: The rejection is as set forth above in claim 1 wherein further JP10-255827 discloses in Figures 1-3 a control system comprising: at least one flow regulator (11^1, 9^1), which is configured to regulate the oxidant flow to the direct and bypass flow channels; a flow controller (5), which is configured to receive the feedback signal and to actuate the at least one flow regulator; and at least one control sensor (4), which is configured to supply the feedback signal to the flow controller.

Claim 9: The rejection is as set forth above in claim 1 wherein further JP10-255827 discloses in Figures 1-3 a flow regulator comprising at least one control valve (11 and 9).

Claim 12: The rejection is as set forth above in claim 1 wherein further Spaeh et al. disclose an outlet configured to be in fluid communication with a subsequent inlet of a subsequent fuel cell assembly (col. 3: 26-39 and Figure 3)

Claim 13: The rejection is as set forth above in claim 1 wherein further JP10-255827 discloses in Figures 1-3 an inlet configured to be in fluid communication with a preceding outlet of a preceding fuel cell assembly.

Claims 21 and 23: JP10-255827 discloses in Figures 1-3 a fuel cell assembly comprising: an inlet and an outlet, the inlet and outlet being configured to provide fluid communication to and from the fuel cell, respectively; at least one bypass flow duct ($8^{1\text{-}N}$, $9^{1\text{-}N}$) and configured to be in fluid communication with the inlet; at least one fuel cell stack (1^1-1^N) disposed within the housing and defining at least one direct flow channel (via $6^{1\text{-}N}$, $7^{1\text{-}N}$), the at least one fuel cell stack comprising at least one fuel cell (1^1), and the direct flow channel being configured to be in fluid communication with the inlet and outlet; and a control system (5), which is configured to control an oxidant flow (3) from the inlet to said direct flow channel and

the bypass flow duct; and wherein the bypass flow duct extends along an outer wall of the housing (abstract, and paragraphs [0008]-[0014]).

JP10-255827 does not disclose a housing having an inlet and an outlet and defining at least one bypass flow channel.

Spaeh et al. in Figures 1 and 2 define a housing (14) having an inlet (4) and an outlet (4) configured to provide fluid communication to and from the housing, and wherein supply air is freely guided to the cell within the housing which would provide a bypass flow of air (col. 2: 26-67).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have modified the fuel cell assembly of JP10-255827 by incorporating the housing of Spaeh et al. because Spaeh et al. teach a housing that would have provided an air supply guidance means common to a plurality of fuel cell stacks and is not connected directly with the fuel cell stacks thus providing an easy interchangeably of individual fuel cell stacks thereby improving the overall efficiency and maintenance costs.

Accordingly, the JP10-255827 combination would obviously provide at least one bypass flow channel defined by the housing and an inlet and configured to provide fluid communication to and from the housing.

Claim 40: JP10-255827 discloses in Figures 1-3 a fuel cell assembly comprising: an inlet and an outlet and at least one bypass flow channel (8^{1-N}, 9^{1-N}), which is configured to be in fluid communication with the inlet and the outlet, the inlet and outlet being configured to provide fluid communication to and from the fuel cell assembly, respectively; at least one fuel cell stack (1^{1}-1^{N}) and at least one direct flow channel (via 6^{1-N}, 7^{1-N}), the at least one fuel cell stack comprising

at least one fuel cell (1^1), and the direct flow channel being configured to be in fluid communication with the inlet and outlet; and a control system (5), which is configured to control an oxidant flow (3) through the direct and bypass flow channels (abstract, and paragraphs [0008]-[0014]).

JP10-255827 does not disclose a housing having an inlet and an outlet and defining at least one bypass flow channel.

Spaeh et al. in Figures 1 and 2 define a housing (14) having an inlet (4) and an outlet (4) configured to provide fluid communication to and from the housing, and wherein supply air is freely guided to the cell within the housing which would provide a bypass flow of air (col. 2: 26-67).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have modified the fuel cell assembly of JP10-255827 by incorporating the housing of Spaeh et al. because Spaeh et al. teach a housing that would have provided an air supply guidance means common to a plurality of fuel cell stacks and is not connected directly with the fuel cell stacks thus providing an easy interchangeably of individual fuel cell stacks thereby improving the overall efficiency and maintenance costs.

Accordingly, the JP10-255827 combination would obviously provide at least one bypass flow channel defined by the housing and an inlet and configured to provide fluid communication to and from the housing.

Claim 41: The rejection of claim 41 is as set forth above in claim 4.

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

4. Claims 5 and 6 are rejected under 35 U.S.C. 103(a) as being unpatentable over JP10-255827 in view of Spaeh et al. as applied to claims 1-4 above, and further in view of JP7-249419.

JP10-255827 and Spaeh et al. are as applied, argued, and disclosed above and incorporated herein.

Claims 5 and 6: The JP10-255827 combination does not disclose a control sensor (abnormality detecting device) configured to monitor a parameter selected from the group consisting of temperature, voltage, electrical current, and heat flux; and, wherein said control sensor comprises a temperature sensor.

JP7-249419 discloses a control sensor (abnormality detecting device) configured to monitor temperature and, wherein the control sensor comprises a temperature sensor (a thermocouple)(paragraph [0077]).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have modified the control sensor of the JP10-255827 combination by incorporating the control sensor of JP7-249419 because JP7-249419 teaches a control sensor that

would have provided a means for eliminating the temperature distribution within a fuel cell thereby stabilizing cell performance and prolonging cell lifetime.

5. Claims 7 and 8 are rejected under 35 U.S.C. 103(a) as being unpatentable over JP10-255827 in view of Spaeh et al. as applied to claims 1-4 above, and further in view of JP7-249419 as applied to claims 5-6 above, and further in view of Applicants' admitted prior art.

JP10-255827, Spaeh et al. and JP7-249419 are as applied, argued, and disclosed above, and incorporated herein.

Claims 7 and 8: The JP10-255827 combination does not disclose an invasive temperature sensor and a non-invasive temperature sensor.

The Applicant discloses in paragraph [0025] of the instant specification known invasive temperature sensors, which are in intimate contact with a downstream control point, and non-invasive temperature sensor, which are in remote communication with an upstream control point.

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention made to have modified the control sensor of the JP10-255827 combination by incorporating the control sensors of the Applicants' admitted prior art because the Applicant discloses known control sensor that would have provided temperature detection at an upstream control point and a downstream control point thereby providing a means for improving the overall operating efficiency and control of the fuel cell.

6. Claims 14 and 15 are rejected under 35 U.S.C. 103(a) as being unpatentable over JP10-255827 in view of Spaeh et al. as applied to claims 1 and 2 above, and further in view of EP0374368.

JP10-255827 and Spaeh et al. are as applied, argued, and disclosed above, and incorporated herein.

Claims 14 and 15: The JP10-255827 combination does not disclose a housing configured to be pressurized, and wherein the inlet is configured to be in fluid communication with a preceding outlet of a turbine engine, and wherein the outlet is configured to be in fluid communication with a subsequent inlet of a turbine engine.

EP0374368 in the Figure discloses a housing (20) configured to be pressurized, and wherein the inlet (to cathode 12) is configured to be in fluid communication with a preceding outlet of a turbine (16) engine (via compressor 10), and wherein the outlet is configured to be in fluid communication with a subsequent inlet of a turbine engine (16) (col. 3: 6-8 and 22-25) (See also col. 3: 1-col. 4: 15).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have modified the apparatus of the JP10-255827 combination with the pressurized housing and turbine of EP0374368 because EP0374368 discloses a pressurized housing and turbine that would have provided a pressurized environment for electrochemically reacting a pressurized oxidant stream thereby improving the overall operating efficiency and power density of the fuel cell.

7. Claim 16 is rejected under 35 U.S.C. 103(a) as being unpatentable over JP10-255827 in view of Spaeh et al. as applied to claim 1 above, and further in view of Scheffler et al. (4,859,545).

JP10-255827 and Spaeh et al. are as applied, argued, and disclosed above, and incorporated herein.

Claim 16: The JP10-255827 combination discloses a bypass flow channel but not a bypass flow channel configured to recycle at least a portion of the oxidant flow through the bypass flow channel to an inlet.

Scheffler et al. in the Figure disclose a bypass flow channel (24) configured to recycle at least a portion of the oxidant flow through the bypass flow channel to an inlet (18).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have modified the apparatus of JP10-255827 by incorporating the bypass flow channel of Scheffler et al. because Scheffler et al. teach a bypass flow channel that would provided a means for regulating the total oxygen content entering the cathode side of a fuel cell when the stack is operating at partial power levels thereby improving the overall performance of the fuel cell stack.

Further, it would have been within the skill of one having ordinary skill in the art of process control and feedback systems to modify the apparatus of the JP10-255827 combination to provide the configuration to recycle at least a portion of the oxidant flow through the bypass flow channel to an inlet.

8. Claims 17, 19 and 20 are rejected under 35 U.S.C. 103(a) as being unpatentable over JP10-255827 in view of Spaeh et al. as applied to claim 1 above, and further in view of Applicant's admitted prior art.

JP10-255827 and Spaeh et al. are as applied, argued, and disclosed above, and incorporated herein.

Claims 17, 19 and 20: The JP10-255827 combination discloses a fuel cell system but does not disclose cells selected from the group consisting of a solid oxide fuel cell, a proton exchange membrane fuel cell, a molten carbonate fuel cell, a phosphoric acid fuel cell, an alkaline fuel cell, a direct methanol fuel cell, a regenerative fuel cell, a zinc air fuel cell, and a protonic ceramic fuel cell; wherein said at least one fuel cell stack comprises a plurality of planar fuel cells arranged in a stack; and, wherein said at least one fuel cell stack comprises a plurality of fuel cells arranged in a tubular configuration.

The Applicant discloses in paragraphs [0002] and [0021] known fuel cells consisting of a solid oxide fuel cell, a proton exchange membrane fuel cell, a molten carbonate fuel cell, a phosphoric acid fuel cell, an alkaline fuel cell, a direct methanol fuel cell, a regenerative fuel cell, a zinc air fuel cell, and a protonic ceramic fuel cell; wherein said at least one fuel cell stack comprises a plurality of planar fuel cells arranged in a stack; and, wherein said at least one fuel cell stack comprises a plurality of fuel cells arranged in a tubular configuration.

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have modified the fuel cell system of JP10-255827 combination with known fuel cells as disclosed in the Applicant's admitted prior art because the Applicant discloses known fuel cells of a specific type and configuration that would have provided energy conversion devices that operate at high efficiency and low pollution thereby providing cost advantages.

9. Claim 18 is rejected under 35 U.S.C. 103(a) as being unpatentable over JP10-255827 in view of Spaeh et al. as applied to claim 1 above, and further in view of Applicant's admitted prior art as applied to claim 17 above, and further in view of EP0374368.

JP10-255827, Spaeh et al. and Applicant's admitted prior art are as applied, argued and disclosed above, and incorporated herein.

Claim 18: The JP10-255827 combination does not disclosed a pressure vessel.

EP0347368 in the Figure discloses a housing (20) configured to be pressurized (col. 3: 1-col. 4: 15).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have modified the apparatus of JP10-255827 combination with the pressurized housing of EP0374368 because EP0374368 discloses a pressurized housing that would have provided a pressurized environment for electrochemically reacting a pressurized oxidant stream thereby improving the overall operating efficiency and power density of the fuel cell.

10. Claims 26-27, 30 and 31 are rejected under 35 U.S.C. 103(a) as being unpatentable over JP255827 in view of Spaeh et al. in view of Applicants admitted prior art, and in view of EP0374368.

Claims 26, 27, 30 and 31: The rejection is as set forth above in claim 1. However, the JP10-255827 combination does not disclose a housing configured to be pressurized, and wherein the inlet is configured to be in fluid communication with a preceding outlet of a turbine engine,

and wherein the outlet is configured to be in fluid communication with a subsequent inlet of a turbine engine.

EP0374368 in the Figure discloses a housing (20) configured to be pressurized, and wherein the inlet is configured to be in fluid communication with a preceding outlet of a turbine (16) engine, and wherein the outlet is configured to be in fluid communication with a subsequent inlet of a turbine engine (16) (col. 3: 6-8 and 22-25) (See also col. 3: 1-col. 4: 15).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have modified the apparatus of the JP10-255827 combination with the pressurized housing and turbine of EP0374368 because EP0374368 discloses a pressurized housing and turbine that would have provided a pressurized environment for electrochemically reacting a pressurized oxidant stream thereby improving the overall operating efficiency and power density of the fuel cell.

The JP10-255827 combination does not disclose a planar solid oxide cell stack, and a plurality of planar solid oxide fuel cells arranged in a stack.

The Applicant discloses in paragraphs [0002] and [0021] known fuel cells consisting of a solid oxide fuel cell; and, wherein said at least one fuel cell stack comprises a plurality of planar fuel cells arranged in a stack.

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have modified the fuel cell system of the JP10-255827 combination with known fuel cells as disclosed in the Applicant's admitted prior art because the Applicant discloses known fuel cells of a specific type and configuration that would have provided energy

conversion devices that operate at high efficiency and low pollution thereby providing cost advantages.

18. Claims 28 and 29 are rejected under 35 U.S.C. 103(a) as being unpatentable over JP255827 in view of Spaeh et al., and further in view of Applicants admitted prior art, and further in view of EP0374368 as applied to claim 26 above, and further in view of JP9-223512.

Claims 28 and 29: JP10-255827, Applicant's admitted prior art, and EP0347368 is as applied, argued, and disclosed above and incorporated herein, and wherein further JP10-255827 discloses control system configured to repeatedly monitor feedback signals and comprising: a flow regulator (11, 9), which is configured to regulate the oxidant flow (3) to the direct and bypass flow channels; a flow controller (5), which is configured to communicate a feedback signal and to actuate the at least one flow regulator, and at least one control sensor (abnormality detector), which is configured to generate the feedback signal from at least one control point and communicate the feedback signal to the flow controller.

The JP10-255827 combination does not disclose a control sensor (abnormality detecting device) configured to monitor temperature wherein said control sensor comprises a temperature sensor.

JP9-223512 in Figure 1 discloses a control sensor (abnormality detecting device) configured to monitor temperature and, wherein the control sensor comprises a temperature sensor (a thermocouple)(abstract).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have modified the control sensor of the JP10-255827 combination by

incorporating the control sensor of JP9-223512 because JP9-223512 teaches a control sensor that would have provided a means for measuring temperature and load current variations in a fuel cell thereby providing a means for improving the overall operating efficiency and control of the fuel cell.

11. Claim 10, 11 and 24 are rejected under 35 U.S.C. 103(a) as being unpatentable over JP10-255827 in view of Spaeh et al. as applied to claim 1 and 21 above, and further in view of Gillett et al. (6,764,784)

JP10-255827 and Spaeh et al. are as applied, argued, and disclosed above, and incorporated herein.

Claims 10, 11 and 24: the JP10-255827 combination does not disclose a bypass oxidant flow channel extending along an inner surface of the housing, disposed within the housing, or flow liner.

Gillett et al. in Figures 2 and 4 disclose a housing enclosing fuel cell stack assembly modules including flow ducts. Gillett et al. disclose that ducting can be on the sides, top or bottom of the module housing, and any suitable ducting is within the invention. Gillett also discloses that thermal insulation (which has been construed as a flow liner) is disposed within the housing and that ducting disposed between said flow liner and said housing and extends along an inner surface of said housing.

Therefore, it would have been within the skill of the art at the time the invention was made to have modified the housing of JP10-255827 combination by incorporating the housing of Gillett et al. because Gillett et al. teach a housing for a fuel cell module that would have provided

a totally pressurized or non-pressurized enclosed system for the fuel cells including direct and bypass ducting and a liner that would have prevented high temperatures at the vessel wall thereby improving the functionality of the system, and overall performance and efficiency of the power generating system.

(10) Response to Argument

A. Ground of Rejection No. 1:

a. On page 8, paragraph 3, of the Appeals Brief, the Applicant argues, "Appellant further notes that the Examiner has pointed to no teaching in JP 10-255827 of at least one direct flow channel that is defined by at least one fuel cell stack, where the direct flow channel is configured to be in fluid communication with an inlet and outlet of a housing, as recited by Claim 1.

In response, JP10-255827 in Figure 1 shows a fuel cell stack comprising two or more fuel cells (1_1-1_N) wherein passages are provided for supplying fuel and oxidation gas to the fuel cell stack. These gas supply passages are shown in Figures 1 as being in fluid communication with a fuel cell stack inlet and outlet, and have been construed as at least one direct flow channel.

On page 9 of the Appeals Brief, the Applicant argues, "However, Appellant respectfully submits that Spaeh teaches away from several of the recitations of Claim 1. For example, Spaeh teaches away from the use of a direct flow channel configured to be in flow communication with the inlet and outlet, as recited by Claim 1. Instead, Spaeh teaches that the supply air is freely guided to the fuel cell stacks within the enclosure (Abstract, FIG. 1). Moreover, Spaeh also

teaches away from the claimed control system, which is configured to control an oxidant flow from the inlet to the direct and bypass flow channels. Namely, Spaeh teaches that the supply air is freely guided to the fuel cell stacks (Abstract). The instant invention can not be arrived at by merely combining the teachings of Spaeh and JP 10-255827.

Further, the combination suggested by the Examiner appears to ignore the purpose of JP 10-255827, namely to stop power generation in a fuel cell for which an abnormality is detected. For example, it is not clear to Appellant whether replacing the oxidizing gas bypass valve 9 of JP 10-255827 with the guiding of supply air to the fuel cell stacks within the enclosure of Spaeh would render the resulting combination unsuitable for the purpose of JP 10-255827, namely stopping power generation in a fuel cell for which an abnormality is detected. Accordingly, Appellant respectfully submits that one skilled in the art would not modify JP 10-255827 in the manner suggested by the Examiner, as the proposed modification might render the system unsuitable for the intended purpose of JP 10-255827.

In addition, Appellant respectfully submits that even if one skilled in the art were motivated to combine the two references in the manner suggested by the Examiner, the Examiner has pointed to no teaching in the cited art suggesting that the resulting combination would include at least one direct flow channel that is defined by at least one fuel cell stack, where the direct flow channel is configured to be in fluid communication with an inlet and outlet of a housing, as recited by Claim 1 ."

In response, JP10-255827 teaches all of the limitations of claims but is silent as to a housing having an inlet and an outlet, the inlet and outlet configured to provide fluid communication to and from the housing. Spaeh et al. has been relied upon ***solely*** for its teaching

in Figures 1 and 2 that it is known in the art to enclose a fuel cell stack in a housing having an inlet and an outlet, the inlet and outlet configured to provide fluid communication to and from the housing.

Furthermore, JP10-255827 discloses in paragraph [0010] that fuel and oxidation gas are supplied to the fuel cell stack from the outside which has been construed as meaning that the source of fuel and oxidation gas is supplied from outside the fuel cell stack and distributed within (inside) the fuel cell stack via passages, which the Examiner has construed as suggesting that the fuel cell stack is enclosed.

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have modified the fuel cell assembly of JP10-255827 by incorporating the housing of Spaeh et al. because Spaeh et al. teach that it is known to enclose a fuel cell within a housing and Spaeh et al. teach a housing that would have provided thermal isolation and a leak proof environment thereby improving the overall efficiency and performance of the fuel cell assembly.

Further, modifying the fuel cell features of JP10-255627 including the direct flow channels ($6^{1\text{-}N}$, $7^{1\text{-}N}$), bypass flow channels ($8^{1\text{-}N}$, $9^{1\text{-}N}$), and control system (5) of JP10-255827 by incorporating the housing of Spaeh et al. would obviously provide a direct flow channel that is defined by at least one fuel cell stack, where the direct flow channel is configured to be in fluid communication with an inlet and an outlet of a housing.

b. On page 10, paragraphs 2 and 3 of the Appeals Brief, the Applicant states, "... The fuel cell assembly further includes at least one bypass flow duct extending along the housing and configured to be in fluid communication with the inlet.

As noted on page 8 of the Office Action, JP 10-255827 does not disclose a bypass flow duct extending along a housing, as recited by Claim 2. Spaeh is cited to disclose this deficiency. However, Spaeh does not disclose a bypass duct extending along a housing, as recited by Claim 21. Rather, in Spaeh, supply air is guided freely by means of a housing (Col. 1, lines 59-61)."

In response, Spaeh et al. have been relied upon ***solely*** upon for their teaching in Figures 1 and 2 that it is known in the art to enclose a fuel cell stack in a housing having an inlet and an outlet, the inlet and outlet configured to provide fluid communication to and from the housing. JP10-255827 discloses a bypass passage (duct) configured to be in fluid communication with the inlet.

Applicant further argues, "Moreover, Appellant respectfully submits that the Examiner has pointed to no teaching in JP 10-255827 of at least one direct flow channel defined by the at least one fuel cell stack and configured to be in fluid communication with the inlet and outlet, as recited by Claim 21 . Further, Appellant submits that Spaeh teaches away from a direct flow channel defined by the at least one fuel cell stack, in that Spaeh teaches that the supply air should be guided freely by means of a housing (Abstract, FIG. 1). In addition, Appellant submits that one skilled in the art would not modify JP 10-255827 in the manner suggested by the Examiner, given that the proposed modification might render JP 10-255827 unsuitable for its stated purpose, namely to stop power generation in a fuel cell for which an abnormality is detected."

In response, JP10-255827 teaches all of the limitations of claims but is silent as to a housing having an inlet and an outlet, the inlet and outlet configured to provide fluid communication to and from the housing. Spaeh et al. has been relied upon ***solely*** upon for their teaching in Figures 1 and 2 that it is known in the art to enclose a fuel cell stack in a housing having an inlet and an outlet, the inlet and outlet configured to provide fluid communication to and from the housing.

Furthermore, JP10-255827 discloses in paragraph [0010] that fuel and oxidation gas are supplied to the fuel cell stack from the outside which has been construed as meaning that the source of fuel and oxidation gas is supplied from outside the fuel cell stack and distributed within (inside) the fuel cell stack via passages, which the Examiner has construed as suggesting that the fuel cell stack is enclosed.

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have modified the fuel cell assembly of JP10-255827 by incorporating the housing of Spaeh et al. because Spaeh et al. teach that it is known to enclose a fuel cell within a housing and Spaeh et al. teach a housing that would have provided thermal isolation and a leak proof environment thereby improving the overall efficiency and performance of the fuel cell assembly.

Further, modifying the fuel cell features of JP10-255627 including the direct flow channels ($6^{1\text{-}N}$, $7^{1\text{-}N}$), bypass flow channels ($8^{1\text{-}N}$, $9^{1\text{-}N}$), and control system (5) of JP10-255827 by incorporating the housing of Spaeh et al. would obviously provide a direct flow channel that is defined by at least one fuel cell stack, where the direct flow channel is configured to be in fluid communication with an inlet and an outlet of a housing.

c. On page 11 of the Appeals Brief, the Applicant argues, "As noted on page 8 of the Office Action, JP 10-255827 does not disclose a bypass flow channel defined by a housing, as recited by Claim 40. Spaeh is cited to supply this deficiency of JP 10-255827. However, Spaeh does not disclose a bypass flow channel defined by a housing, as recited by Claim 40. Rather, in Spaeh, supply air is guided freely by means of a housing that is common to a plurality of fuel cell stacks and is not connected directly to the fuel cell stacks (Col. 1, lines 59-61).

In addition, Appellant respectfully submits that the Examiner has pointed to no teaching in JP 10-255827 of at least one direct flow channel defined by at least one fuel cell stack and configured to be in fluid communication with the inlet and outlet, as recited by Claim 40. Further, Appellant submits that Spaeh teaches away from a direct flow channel defined by at least one fuel cell stack, in that Spaeh teaches that the supply air should be guided freely by means of a housing (Abstract, FIG. 1). Moreover, Appellant submits that one skilled in the art would not modify JP 10-255827 in the manner suggested by the Examiner, given that the proposed modification might render JP 10- 255827 unsuitable for its stated purpose, namely to stop power generation in a fuel cell for which an abnormality is detected."

In response, JP10-255827 teaches all of the limitations of claims but is silent as to a housing having an inlet and an outlet, the inlet and outlet configured to provide fluid communication to and from the housing. Spaeh et al. have been relied upon ***solely*** upon for their teaching in Figures 1 and 2 that it is known in the art to enclose a fuel cell stack in a housing having an inlet and an outlet, the inlet and outlet configured to provide fluid communication to and from the housing.

Furthermore, JP10-255827 discloses in paragraph [0010] that fuel and oxidation gas are supplied to the fuel cell stack from the outside which has been construed as meaning that the source of fuel and oxidation gas is supplied from outside the fuel cell stack and distributed within (inside) the fuel cell stack via passages, which the Examiner has construed as suggesting that the fuel cell stack is enclosed.

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have modified the fuel cell assembly of JP10-255827 by incorporating the housing of Spaeh et al. because Spaeh et al. teach that it is known to enclose a fuel cell within a housing and Spaeh et al. teach a housing that would have provided thermal isolation and a leak proof environment thereby improving the overall efficiency and performance of the fuel cell assembly.

Further, modifying the fuel cell features of JP10-255627 including the direct flow channels ($6^{1\text{-}N}$, $7^{1\text{-}N}$), bypass flow channels ($8^{1\text{-}N}$, $9^{1\text{-}N}$), and control system (5) of JP10-255827 by incorporating the housing of Spaeh et al. would obviously provide a direct flow channel that is defined by at least one fuel cell stack, where the direct flow channel is configured to be in fluid communication with an inlet and an outlet of a housing.

In addition, the recitation "configured to", (as recited in claims 1, 2, 3, 4, 12, 13, 21, 22, 40 and 41) perform a function is not a positive limitation but only requires the ability to so perform. Accordingly, because the fuel cell assembly of the JP10-255827 combination is structurally similar to what is instantly claimed, it appears capable of so performing.

B. Ground of Rejection No. 2:

On page 12 and 13 of the Appeals Brief, of the Appeals Brief, the Applicant argues, "On page 10 of the Office Action, the Examiner indicates that the English language abstract of JP 10-255827 does not disclose a control sensor configured to monitor a parameter selected from the group consisting of temperature, voltage, electrical current, and heat flux, as recited by Claim 5. JP 249419 is thus cited to supply the specific recitations of dependent Claims 5 and 6. JP 249419 is directed to a fuel cell. When the temperature abnormally rises, the flow quantity control valve 69 arranged in the oxidant gas flow passage 6 is opened to increase the quantity of the oxidant gas. (Abstract) Although JP 249419 discusses a bypass slot 62 (see for example paragraphs 29-30 and 61), as described with respect to FIG. 7, the bypass slot 62 appears to be formed within the fuel cell. Accordingly, Appellant submits that JP 249419 does not supply the above stated deficiencies of JP 10- 255827 and Spaeh."

In response, JP10-255827 discloses in paragraph [0006] that the fuel cell generation of electrical energy system is equipped with an oxidation gas transfer unit (3) which adjusts oxidation gas including air etc. to predetermined temperature and pressure. Further, in paragraph [0011], JP10-255827 discloses that the malfunction (which the Examiner has construed as temperature, pressure, or flow quantity) detected with fuel cell malfunction detection equipment 4 is inputted into a by-pass control equipment 5. The bypass control equipment 5 controls the oxidation gas bypass valve. Thus, JP10-255827 suggests a temperature detector configured to supply feed back to a flow controller.

JP7-249419 is relied upon to supply a control sensor configured to monitor a temperature and, wherein the control sensor comprises a temperature sensor (a thermocouple).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have modified the control sensor of the JP10-255827 combination by incorporating the control sensor of JP7-249419 because both are concerned with detecting a temperature malfunction and controlling the flow of gas via a control valve, and JP7-249419 teaches a control sensor that would have provided a means for eliminating the temperature distribution within a fuel cell thereby stabilizing cell performance and prolonging cell lifetime.

In addition, the recitation "configured to", (as recited in claim 5) perform a function is not a positive limitation but only requires the ability to so perform. Accordingly, because the fuel cell assembly and in particular, the control system of the JP10-255827 combination is structurally similar to what is instantly claimed, it appears capable of so performing.

C. Ground of Rejection No. 3:

On page 14 of the Appeals Brief, the Applicant argues, "Paragraph 25 of the present application explains that both invasive and non- invasive temperature sensors are known. However, Paragraph 25 does not suggest that the claimed use of such sensors is known. Accordingly, Appellant respectfully submits that the Examiner has not pointed to any specific teaching in the art to employ an invasive temperature sensor, which is in intimate contact with a downstream control point (Claim 7). Nor, has the Examiner pointed to any specific teaching in the art to employ a non-invasive temperature sensor, which is in remote communication with an upstream control point (Claim 8)."

In response, paragraph [0025], of the instant specification, discloses, "...One exemplary temperature sensor 210 is an evasive temperature sensor 210, which is in intimate contact with a downstream control point in fuel cell assembly 10. Invasive temperatures sensors 210 are known, examples in thermocouples...Another exemplary temperature sensor 210 is a non-invasive temperature sensor, which is in remote communication with an upstream control point 128 in fuel cell assembly 50. Non-invasive temperature sensors 210 are known, and examples thereof include..."

This disclosure has been construed as a prior art admission that invasive and non-invasive temperature sensors as well as their upstream and downstream control points are known in the art.

D. Ground of Rejection No. 4:

On page 15 of the Appeals Brief, the Applicants argues, "The Examiner cites EP0374368 to supply the additional recitations of Claims 14 and 15. However, E130374368 does not supply the above-described deficiencies of JP 10- 255827 and Spaeh. In particular, although the Figure of EP0374368 shows flow of purge air around fuel cell stack 8, the air flow from compressor 10 is separate, and E130374368 does not teach a control system, which is configured to control an oxidant flow from an inlet to direct and bypass flow channels, as is recited by Claim 1."

In response, EP0374368 has been relied upon ***solely*** for its teaching that it is known to enclose fuel cells in pressurized housings, and further that fuel cell inlet and outlets are known to be combined with a turbine inlet and outlet as taught by EP0374368.

In addition, the recitation "configured to", (as recited in claims 14 and 15) perform a function is not a positive limitation but only requires the ability to so perform. Accordingly, because the fuel cell assembly and in particular, the housing and housing inlet and outlet of the JP10-255827 combination is structurally similar to what is instantly claimed, it appears capable of so performing.

E. Ground of Rejection No. 5:

On page 16 of the Appeals Brief, the applicant argues, "... As noted by the Examiner, JP 10-255827 and Spaeh do not teach or suggest a bypass flow channel, which is configured to recycle at least a portion of the oxidant flow through the bypass flow" channel to the inlet, as recited by Claim 16.

Scheffler is cited to supply this deficiency of JP 10-255827. Scheffler is directed to cathode flow control for a fuel cell power plant. Scheffler employs a cathode exhaust recirculating loop 24 for recirculating cathode exhaust. In contrast, the claimed bypass flow channel recycles at least a portion of the oxidant flow through the bypass flow channel to the inlet."

In response, Scheffler et al. disclose on col. 2:25-27 and 30-32 that the oxygen-bearing gas, such as air, enters the cathode side via cathode inlet and exhaust from the cathode inlet leaves through the cathode exhaust line. A cathode exhaust line recirculating loop extends from the cathode exhaust line to the cathode inlet. Scheffler et al.'s oxygen-bearing gas such as air has been construed as oxidant flow through a bypass flow channel to the inlet.

In addition, the recitation "configured to", (as recited in claim 16) perform a function is not a positive limitation but only requires the ability to so perform. Accordingly, because the fuel cell assembly and in particular, the bypass flow channel of the JP10-255827 combination is structurally similar to what is instantly claimed, it appears capable of so performing.

F. Ground of Rejection No. 6:

On page 16 of the Appeal Brief, the Applicant argues that claims 17, 19 and 20 are patentably distinguishable over the cited art.

In response, the Applicants' disclosure in paragraph [0002] and 0021] has been construed as a prior art admission that the structural limitations of the claims are known in the art, and has

been relied upon solely for it prior art teaching to further modify the fuel cells of the JP10-255827 combination.

G. Ground of Rejection No. 7:

The Applicant, on page 17 of the Appeals Brief argues, "The reasons presented above with respect to Claim 1 apply with equal force to Claim 18. Further, as discussed above with respect to Claims 14 and 15, EP0374368 does not supply the deficiencies of JP 10-255827 and Spaeh with respect to Claim 1, nor does "Appellant's admitted prior a14." Accordingly, Appellant respectfully submits that Claim 18 is patentably distinguishable over the cited art, either alone or in combination. "

In response, claim 18 is directed toward a housing comprising a pressure vessel, and each fuel cell comprising a solid oxide fuel cell. As to the housing comprising a pressure vessel, JP10-255827 discloses in paragraph [0010] that fuel and oxidation gas are supplied to the fuel cell stack from the outside which has been construed as meaning that the source of fuel and oxidation gas is supplied from outside the fuel cell stack and distributed within (inside) the fuel cell stack via passages, which the Examiner has construed as suggesting that the fuel cell stack is enclosed.

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have modified the fuel cell assembly of JP10-255827 by incorporating the housing of Spaeh et al. because Spaeh et al. teach that it is known to enclose a fuel cell within a housing and Spaeh et al. teach a housing that would have provided thermal isolation and a leak proof environment thereby improving the overall efficiency and performance of the fuel cell assembly. Further, EP0374368 has been relied upon solely for its teaching that it is known to

enclose fuel cells in pressurized housings. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have modified the housing of JP10-255827 combination by incorporating the pressurized housing of EP0374368.

As to the solid oxide fuel cells, the Applicants' disclosure in paragraph [0002] and 0021] has been construed as a prior art admission that the structural limitations of the claims are known in the art, and has been relied upon ***solely*** for its prior art teaching to further modify the fuel cells of the JP10-255827 combination.

H. Ground of Rejection No. 8:

On page 18 of the Appeals Brief, the applicant argues, that JP 10-255827 and Spaeh do not disclose, either alone or in combination, at least one bypass flow channel defined by a pressure vessel having an inlet and an outlet, the bypass flow channel being configured to be in fluid communication with the inlet, as recited by Claim 26. Nor do JP 10-255827 and Spaeh disclose at least one direct flow channel defined by at least one planar solid oxide fuel cell stack and configured to be in fluid communication with the inlet and outlet, as recited by Claim 26.

In response, JP10-255827 in Figure 1 shows a fuel cell stack comprising two or more fuel cells (1_1-1_N) wherein passages are provided for supplying fuel and oxidation gas to the fuel cell stack. These gas supply passages are shown in Figures 1 as being in fluid communication with a fuel cell stack inlet and outlet, and have been construed as at least one direct flow channel.

The Applicant further argues, "The Examiner cites "Appellant's admitted prior art" for teachings of specific fuel cell types and this art does not supply the above discussed deficiencies of JP 10-255827 and Spaeh."

In response, the Applicants' disclosure in paragraph [0002] and 0021] has been construed as a prior art admission that the claimed fuel cell types are known in the art, and has been relied upon ***solely*** for it prior art teaching to further modify the fuel cells of the JP10-255827 combination.

Further, the Applicant argues, "On page 14 of the Office Action, the Examiner notes that JP 10-255827 and Spaeh do no disclose a pressure vessel having an inlet and an outlet, and the inlet and outlet being configured to provide fluid communication to and from the pressure vessel respectively, as recited by claim 26. The Examiner cites EP 0374368 to supply this additional deficiency of JP 10-255827 and Spaeh. However, EP 0374368 does not disclose a bypass flow channel defined by a pressure vessel with a control system, which is configured to adjust an oxidant flow from the inlet to the direct and bypass flow channels in response t. a feedback signal, as recited by Claim 26. For example, although the Figure of E130374368 shows flow of purge air around fuel cell stack 8, the air flow from compressor 10 is separate and distinct from the flow of purge air from blower 18. (See Figure.)"

In response, EP0374368 has been relied upon solely for its teaching that it is known to enclose fuel cells in pressurized housings, and further that fuel cell inlet and outlets are known to be combined with a turbine inlet and outlet as taught by EP0374368.

In addition, the recitation "configured to", (as recited in claims 26, 30 and 31) perform a function is not a positive limitation but only requires the ability to so perform. Accordingly, because the fuel cell assembly and in particular, the control system and housing of the JP10-255827 combination is structurally similar to what is instantly claimed, it appears capable of so performing.

I. Ground of Rejection No. 9:

On page 20 of the Appeals Brief, the applicant argues that JP9-223512 does not supply the above-discussed deficiencies of JP 10-255827, Spaeh, EP 0347368 and Appellant's admitted prior art. Accordingly, Appellant respectfully submits that Claims 28 and 29 are patentably distinguishable over the cited art, either alone or in combination.

In response, JP9-223512 has been relied upon solely for their teaching of a temperature sensor for monitoring fuel cell abnormality. And, because the JP10-255827 combination and JP9-223512 are concerned with detecting a fuel cell abnormality, it would have been obvious to modify the JP10-255827 combination with the temperature sensor of JP9-223512.

In addition, the recitation "configured to", (as recited in claims 28 and 29) perform a function is not a positive limitation but only requires the ability to so perform. Accordingly, because the fuel cell assembly of the JP10-255827 combination is structurally similar to what is instantly claimed, it appears capable of so performing.

J. Ground of Rejection No. 10:

On pages 20 and 21 of the Appeals Brief, the Applicant argues " As noted on page 1 8 of the Office Action, JP 10-255827 and Spaeh do not disclose a bypass oxidant flow channel that is defined by the fuel cell stack and the housing and extends along an inner surface of the housing, as recited by claim 10. The Examiner cites Gillett as support for this additional deficiency of JP 10-255827 and Spaeh. However, although Gillett discusses ducting generally, Gillett does not disclose a bypass oxidant flow channel that extends along an inner surface of the housing."

In response, the JP10-255837 combination discloses a bypass flow channel that is enclosed with a housing having an inlet and an outlet. JP10-255837 discloses the bypass flow channel as a passage which has been construed a ducting. Gillett (US 6,764,784) has been relied upon ***solely*** for its teaching of a fuel cell enclosed in a pressure vessel wherein oxidant flow is via any piping or ducts (col. 5: 51-65) and thermal insulation (col. 7: 7-14).

(11) Related Proceeding(s) Appendix

No decision rendered by a court or the Board is identified by the examiner in the Related Appeals and Interferences section of this examiner's answer.

For the above reasons, it is believed that the rejections should be sustained.

Respectfully submitted,

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